

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in this application:

1. (currently amended) An isolated complex comprising: a ~~An isolated bacterial heme binding protein complexed with a porphyrin~~, wherein said ~~protein complex~~ reversibly binds oxygen with a low affinity and wherein said protein comprises a heme binding domain that associates with the porphyrin and an aerotaxis signaling domain of said ~~protein that shows at least 20% identity to a myoglobin heme binding domain having an amino acid sequence of SEQ ID NO:76.~~

2-5 (canceled)

6. (currently amended) The isolated heme binding protein complex according to claim 1, wherein the protein has an amino acid sequence of SEQ ID NO:2.

7-10 (canceled)

11. (currently amended) A blood substitute comprising comprising: a complex according to claim 1 ~~bacterial heme binding protein wherein said protein reversibly binds oxygen with a low affinity and comprises a heme binding domain that shows at least 20% identity to a myoglobin heme binding domain having an amino acid sequence of SEQ ID NO:76.~~

12-15 (canceled)

16. (previously presented) The blood substitute according to claim 11, wherein the protein has an amino acid sequence of SEQ ID NO:2.

17-47 (canceled)

48. (original) A chimeric protein comprising:
a heme-binding domain of an isolated heme binding bacterial protein; and
a heterologous signaling domain.

49. (previously presented) The chimeric protein according to claim 48, wherein the heterologous signaling domain is a mutated signaling domain having altered affinity for its ligand.

50. (canceled)

51. (previously presented) The chimeric protein according to claim 48, wherein the heme binding domain is from a heme binding protein isolated from *Archaea*.

52. (previously presented) The chimeric protein according to claim 51, wherein the heme binding protein is isolated from *Halobacterium salinarium*.

53. (previously presented) The chimeric protein according to claim 52, wherein the activity of the heme binding protein is salt tolerant.

54. (currently amended) The chimeric protein according to claim ~~52~~ 53, wherein the ~~protein has an~~ the heme binding domain comprises the amino acid sequence of ~~SEQ ID NO: 2~~ SEQ ID NO: 77.

55-65 (canceled)

66. (currently amended) The complex ~~isolated heme-binding protein~~ according to claim 1 wherein the complex ~~protein~~ is purified.

67. (currently amended) The complex ~~isolated heme-binding protein~~ according to claim 1 wherein the complex ~~protein~~ is recombinant.

68. (new) The complex according to claim 1, wherein the heme binding domain comprises a plurality of α -helices.

69. (new) The complex according to claim 68, wherein the heme binding domain comprises eight α -helices.

70. (new) The complex according to claim 1, wherein the heme binding domain is positioned N-terminal and the aerotaxis signaling domain is positioned C-terminal in the heme binding protein.

71. (new) The complex according to claim 1, wherein the heme binding domain is at least 20% identical to SEQ ID NO: 76.

72. (new) The complex according to claim 1, wherein the aerotaxis signaling domain is at least 30% identical to SEQ ID NO: 79.
73. (new) The complex according to claim 1, wherein said protein is about 50 kDa.
74. (new) The complex according to claim 1, wherein the porphyrin is a Fe-porphyrin.
75. (new) The complex according to claim 74, wherein the Fe-porphyrin is a heme molecule.
76. (new) The complex according to claim 75, wherein the heme molecule is a b-type heme molecule.
77. (new) The complex according to claim 75, wherein the complex has an oxygenated form characterized as having spectral properties of: Soret band absorption at 406 nm, α -band absorption at 578 nm, and β -band absorption at 538 nm.
78. (new) The complex according to claim 75, wherein the complex has a deoxygenated form characterized as having spectral properties of: Soret band absorption at 425 nm, and converged α -band and β -band absorption centered at 555 nm.
79. (new) The complex according to claim 1, wherein the porphyrin is a Zn-porphyrin.
80. (new) The complex according to claim 1, wherein the porphyrin is a Sn-porphyrin.
81. (new) The blood substitute according to claim 11, wherein the porphyrin is a Fe-porphyrin.
82. (new) The blood substitute according to claim 81, wherein the Fe-porphyrin is a heme molecule.